

chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators and not less than 115 liters (4 cubic feet) per minute, for powered air-purifying respirators with tight-fitting facepieces, and not less than 170 liters (6 cubic feet) per minute for powered air-purifying respirators with loose-fitting hoods and helmets.

(2) The test aerosol will contain 15–20 milligrams of freshly generated lead-oxide fume, calculated as lead, per cubic meter of air.

(3) The fume will be generated by impinging an oxygen-gas flame on molten lead.

(4) Front-mounted, back-mounted, and chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators will be tested for 90 minutes and powered air-purifying pesticide respirators will be tested for 4 hours.

(5) The total amount of unretained test suspension, which is analyzed and calculated as lead, shall not exceed:

(i) 0.43 milligram for any 90-minute test;

(ii) 4.8 milligrams for any 4-hour test made at 115 liters (4 cubic feet) per minute; or

(iii) 6.2 milligrams for any 4-hour test made at 170 liters (6 cubic feet) per minute.

(e) *Diocetyl-phthalate test.* (1) All canisters submitted for use with front-mounted and back-mounted gas mask pesticide respirators will be tested in an atmospheric concentration of 100 micrograms of diocetyl-phthalate per liter of air at continuous flow rates of 32 and 85 liters per minute for a test period of 5 to 10 seconds.

(2) The DOP leakage through the canister shall not exceed 0.03 percent of the ambient DOP concentration.

(f) *Bench tests for pesticide respirators.* (1)(i) Bench tests will be made on an apparatus that allows the test atmosphere at 50±5 percent relative humidity and at room temperature (25°±2.5° C.) to enter the canister or cartridge at predetermined concentrations and rates of flow, and that has a means for determining the test life of the canister or cartridge against carbon tetrachloride.

(ii) Canisters and cartridges will be tested as they are used on each pes-

ticide respirator, either singly or in pairs.

(iii) Three canisters or cartridges or pairs of cartridges will be removed from containers and tested as received from the applicant.

(iv) Two canisters, cartridges, or pairs of cartridges will be equilibrated at room temperature by passing 25 percent relative humidity air through them at the following flow rates (expressed as liters per minute (l.p.m.)) for 6 hours:

Type of canister or cartridge	Airflow rate, l.p.m.
Air-purifying canister	64
Air-purifying cartridge	25
Powered air-purifying with tight-fitting facepiece ...	115
Powered air-purifying with loose-fitting hood or helmet	170

(v) Two canisters, cartridges, or pairs of cartridges will be equilibrated at room temperature by passing 85 percent relative humidity air through them at the flow rates stated in paragraph (f)(1)(iv) of this section for 6 hours.

(vi) The equilibrated canisters or cartridges will be resealed, kept in an upright position at room temperature, and tested within 18 hours.

(2) Canisters and cartridges tested in accordance with the provisions of this section shall meet the requirements specified in Table 14 of this subpart.

§ 84.1157 Chemical cartridge respirators with particulate filters; performance requirements; general.

Chemical cartridge respirators with particulate filters and the individual components of each such device shall, as appropriate, meet the following minimum requirements for performance and protection:

(a) *Breathing resistance test.* (1) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a chemical cartridge respirator mounted on a test fixture with air flowing at a continuous rate of 85 liters per minute, both before and after each test conducted in accordance with paragraphs (d) through (f) of this section.

(2) The maximum allowable resistance requirements for chemical cartridge respirators are as follows:

MAXIMUM RESISTANCE
[mm. water-column height]

Type of chemical cartridge respirator	Inhalation		Exhalation
	Initial	Final ¹	
For gases, vapors, or gases and vapors, and dusts, fumes, and mists	50	70	20
For gases, vapors, or gases and vapors, and mists of paints, lacquers, and enamels	50	70	20

¹ Measured at end of service life specified in Table 11 in subpart L of this part.

(b) *Facepiece test.* The facepiece test will be conducted as specified in § 84.205.

(c) *Lacquer and enamel mist tests; general.* (1) Three respirators with cartridges containing or having attached to them, filters for protection against mists of paints, lacquers, and enamels shall be tested in accordance with the provisions of paragraph (f) of this section.

(2) In addition to the test requirements set forth in paragraph (c)(1) of this section, three such respirators will be tested against each aerosol in accordance with the provisions of paragraphs (d) and (e) of this section.

(d) *Lacquer mist test.* (1) Temperature in the test chamber will be approximately 25° C.

(2) Continuous airflow through the respirator will be 32 liters per minute for air-purifying respirators, and not less than 115 liters per minute to tight fitting facepieces and 170 liters per minute to loose-fitting hoods and helmets of powered air-purifying respirators.

(3) Airflow through the chamber will be 20–25 air changes per minute.

(4) The atomizer employed will be a No. 64–5 nozzle with setup 3, or equivalent, operating at 69 kN/m.² (10 pounds per square inch gage).

(5) The test aerosol will be prepared by atomizing a mixture of one volume of clear cellulose nitrate lacquer and one volume of lacquer thinner. The lacquer described in Federal Specification TT-L-31, October 7, 1953, is an example of an acceptable lacquer. Copies of TT-L-31 may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 26505–2888.

(6) The concentration of cellulose nitrate in the test aerosol will be 95–125 milligrams per cubic meter.

(7) The test aerosol will be drawn to each respirator for a total of 156 minutes for air-purifying respirators and 240 minutes for powered air-purifying respirators.

(8) The total amount of unretained mist in the samples taken during testing, weighed as cellulose nitrate, shall not exceed 5 milligrams for an air-purifying respirator, 28 milligrams for a powered air-purifying respirator with tight-fitting facepiece, and 41 milligrams for a powered air-purifying respirator with loose-fitting hood or helmet.

(e) *Enamel mist test.* (1) Temperature in the test chamber will be approximately 25° C.

(2) Continuous airflow through the respirator will be 32 liters per minute for air-purifying respirators, and not less than 115 liters per minute to tight-fitting facepieces and 170 liters per minute to loose-fitting hoods and helmets of powered air-purifying respirators.

(3) Airflow through the chamber will be 20–25 air changes per minute.

(4) The atomizer employed will be a No. 64 nozzle with setup 1A, or equivalent, operating at 69 kN/m.² (10 pounds per square inch gage).

(5) The test aerosol will be prepared by atomizing a mixture of 1 volume of white enamel and 1 volume of turpentine. The enamel described in Federal Specification TT-E-489b, May 12, 1953, with amendment-1 of 9 November 1955 is an example of an acceptable enamel. Copies of TT-E-489b may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 26505–2888.

(6) The concentration of pigment in the test aerosol, weighed as ash, will be 95–125 milligrams per cubic meter.

(7) The test aerosol will be drawn to each respirator for a total of 156 minutes for air-purifying respirators and 240 minutes for power air-purifying respirators.

(8) The total amount of unretained mist in the samples taken during testing, weighed as ash, shall not exceed 1.5 milligrams for any air-purifying respirator, 8.3 milligrams for a powered air-purifying respirator with tight-fitting facepiece, and 12.3 milligrams for a powered air-purifying respirator with loose-fitting hood or helmet.

(f) *Bench tests; gas and vapor tests.* (1) Bench tests will be made in accordance with §84.207 and tested cartridges shall meet the minimum requirements set forth in Table 11 of subpart L of this part. Cartridges will be equilibrated in accordance with paragraph (f)(2) of this section.

(2)(i) Two powered air-purifying cartridges or pairs of cartridges will be equilibrated at room temperature by passing 25 percent relative humidity air through them at the following flow rates (expressed in liters per minute (l.p.m.)) for 6 hours:

Type of cartridge	Airflow rate, l.p.m.
Powered air purifying with tight-fitting facepiece ...	115
Powered air purifying with loose-fitting hood or helmet	170

(ii) Two powered air-purifying cartridges or pairs of cartridges will be equilibrated by passing 85 percent relative humidity air through them at the flow rates stated in paragraph (f)(2)(i) of this section.

(iii) All cartridges will be resealed, kept in an upright position, at room temperatures, and tested within 18 hours.

§84.1158 Dust, fume, and mist tests; respirators with filters; minimum requirements; general.

(a) Three respirators with cartridges containing, or having attached to them, filters for protection against dusts, fumes, and mists, except the mists of paints, lacquers, and enamels, will be tested in accordance with the provisions of §84.1157(f).

(b) In addition to the test requirements set forth in paragraph (a) of this section, three such respirators will be tested, as appropriate, in accordance with the provisions of §§84.1141 through 84.1152; however, the maximum allowable resistance of complete dust, fume, and mist, and gas, vapor, or gas and vapor chemical cartridge respirators shall not exceed the maximum allowable limits set forth in §84.1157(a)(2).

TABLES TO SUBPART KK OF PART 84

TABLE 12—FACEPIECE TEST REQUIREMENTS

[42 CFR Part 84, Subpart KK]

Respirator types	Pressure tightness test ¹	Isoamyl acetate test	
		84.1141	84.1142
Dusts: Air Contamination Level not less than 0.05 mg/M ³ or 2 mppcf	X		
Fumes: Air Contamination Level not less than 0.05 mg/M ³	X	X	
Mists: Air Contamination Level not less than 0.05 mg/M ³ or 2 mppcf	X		
Dusts, Fumes, and Mists: Air Contamination Level less than 0.05 mg/M ³ or 2 mppcf, and radionuclides	X		X
Radon daughters	X	X	
Asbestos-containing dusts and mists	X		

¹ Test is required only where applicable.

TABLE 13—AIR-PURIFYING AND POWERED AIR-PURIFYING RESPIRATOR FILTER TESTS REQUIRED FOR APPROVAL

[42 CFR Part 84, Subpart KK]

Respirator types	Silica dust tests			Lead fume test 84.1146	Silica mist test 84.1147	DOP test 84.1151
	84.1144	84.1145	84.1152			
Dusts: Air Contamination Level not less than 0.05 mg/M ³ or 2 mppcf	X					